

330571

**Memo**

May 15, 2009

To: Michael Berkoff, U.S. EPA Region 5

From: Ed Cooney, Consultant for Lovejoy, Inc.

**Re: Site Model for Determination of Potential Remedial Approach****Background**

Lovejoy is located at 2655 Wisconsin Avenue in Downers Grove, Illinois (See Figure 1). The property is located within the Ellsworth Industrial Park (EIP). Remedial investigations were conducted in 2002, 2004, and 2006 - 2007 to fully characterize the extent contamination at the Lovejoy property. Results from these investigations showed the presence of TCE and certain degradation products in site soils.

This document was prepared for EPA's review following our technical meeting on May 8, 2008. I requested this meeting to be able to advise Lovejoy regarding the types of potential removal action(s) and cleanup standards that EPA might be willing to agree to for a removal / remedial action at Lovejoy's property. We understand that EPA is asking each of the potentially responsible parties at the Ellsworth Industrial Park Site ("Site") to propose removal or remedial actions for their property that would begin prior to the entry of a formal Record of Decision. The potential benefit to the PRP is that by agreeing to such early implementation of the remedy selected for its property, EPA would not unilaterally select the remedy in the Record of Decision ("ROD").

We recognize that this is a potentially significant benefit, but there is a serious concern that the draft Remedial Investigation Report ("RI") for the Site has not recognized the unique geology and hydrogeology that is present at Lovejoy's property, and that a "one size fits all" approach to remedial objectives and technologies based on the draft RI would likely require Lovejoy to perform more, and more costly, remedial work than if it continued to comment on its concerns with the draft RI during the full remedy selection process. EPA indicated during our meeting on May 8, 2009, that it is aware of these concerns and agreed to review and comment on the following remedial approach, which we would propose to Lovejoy if EPA believes that the approach will form the basis for an approvable work plan for an early removal / remedial action.

**Site History & TCE Source Description****Harper Wyman Company (1965 – 1971)**

In 1965, Harper Wyman Company (HWC) purchased the property located at 2655 Wisconsin Avenue. The plant manufactured burners that were used in gas ranges and ovens. The burner manufacturing process consisted of four departments - fabrication,

welding (including degreasing and plating), burner cap and valve assembly, and burner assembly. Other departments included a tool room, where dies were repaired, and shipping.

It is believed that the degreaser was used by HWC to remove oil and scale from tubing and flanges before processing. The degreaser, believed to be a vapor phase cleaner using trichloroethylene (TCE), was a long, narrow machine that used a chain hoist to lift baskets of parts and put them in the unit.

Plan sheets, prepared by the building architect, Westing E. Pence, for the HWC building to be constructed in Downers Grove were dated February 4, 1966. The South Section, Building Floor Plan (HWC Drawing 65-902, A-9) provides the dimensions of the die cast, degreasing, and plating areas within the Downers Grove HWC facility. The area planned for degreasing was approximately 25 ft x 20 ft and located in the center of the south section of the building. The plating room was equipped with a floor trench that would have encircled the plating process tanks. The trench drain and plating room layout are given in Drawing PrP-2. Discharges from the plating room, were piped through a 6 inch vitrified clay tile (VCT) pipe to a 3 ft x 6 ft pit containing limestone chips (Plumbing Details Plan, P-4 & Drawing A-5), located beneath the building floor. A second sump, 2 ft by 3ft is also shown. This is indicative that wastewaters from the plating line were highly acidic, and required neutralization before discharge. A copy of the portion of the plan sheet is presented in Figure 2.

In general, discharges within the building would have used the branching network of floor drains and sewer – shown on Drawing P-4 for the south section of the building. Topographic data collected at the time the building was constructed show the general slope of the property is south to north and slightly to the east from the building centerline. This general flow path corresponds to the level of impacts found beneath the building. Additionally, former area floor drains appear to have been plumbed from south to north into the main sanitary sewer or to the east, possibly into the original storm sewer or another sanitary sewer. This line may have been removed or relocated during building expansion.

An overlay of interior impacts reported by Weston in the RI and the location of the degreasing unit and underground piping is shown in Figure 2. Potential releases of TCE from the degreasing unit are:

- Releases of TCE-containing wastewater from sewer system. VCT pipe is constructed in small sections and joints may have leaked into area shallow soils.
- Releases of TCE wastes from degreasing unit. It is possible that TCE-containing wastes or sludge were discharged to sewer or released onsite. The actual means of disposal of wastes from the unit is unknown.
- Releases of TCE by other means such as spills.

### Lovejoy (1971 – present)

Overall the company has been in business for approximately 104 years. Plant operations moved from Chicago (Lake Street) in 1971 to Downers Grove. The basic function of the facility is turning metal parts into couplings. Metal working operations include turning machines, lathes, grinding and polishing. The plant also utilizes a powdered metal process in which sponge iron is compressed into various shapes for working into coupling parts. The principle products made at the facility are power transmission flexible couplings. Products include “C-Hubs”, “Uniflex”, “Universal Joints”, and “Saga” couplings. The company also produces spool pulleys which are made of cast iron.

The principle raw materials used are comprised of steel, aluminum, and cast iron forgings and bar stock. These raw materials are made by other manufacturing companies. These raw materials are received via truck at the loading dock or are stored outside. Raw materials typically arrive at Lovejoy “dry”, i.e., they are not coated with oils. Likewise, finished couplings are shipped out dry.

Before packaging the finished products, a decorative black coating is applied in the “black oxide” line. For many years, manufacturers of firearms, auto parts, turbines, bearings, and electrical parts, along with tool and machinery builders use a black oxide process – which involves the application of a copper selenium compound.

The typical black oxide process line (Lovejoy’s operation is typical - see Figure 2) consists of several dip tanks in series.

1. Alkaline Soak Cleaner
2. Water Rinse
3. Pre-blackening Solution
4. Hot Black Oxide
5. Water Rinse
6. Water Displacing Oil/Rust Preventative

Baskets of parts are lowered into each tank by hoist. After the oil dip tank, the finished products are air dried. Organic solvents are not contained in any of the chemicals used and the line and in general, chlorinated solvents are not compatible with corrosive liquids.

The only chlorinated solvent reported used by plant personnel, was a small amount of methylene chloride, which was used as a cleaning solvent to rag wipe certain products

manufactured for GE. This solvent was used for a short period of time and was purchased in gallon sized containers.

The use of TCE by Harper-Wyman's operation is believed to be the source of TCE on site and have been there since at least March 1971 when Lovejoy bought the property. As discussed below, TCE has not migrated off-site. The other PRPs recognized this fact when Lovejoy received the lowest allocated share in the mediation that occurred among the PRPs to allocate the settlement paid to the plaintiffs in the Muniz class action litigation.

### **Contaminant of Concern**

The contaminant of concern (COCs) at Lovejoy is TCE. Several degradation products of TCE have also been detected in soil samples, however the driver for remedy onsite will be for TCE. Representative results from the investigations of the Lovejoy property are summarized in Table 1 and presented in Figures 3 to 7.

Figure 3 shows the TCE results for samples collected within the building. As discussed above impacts appear to be confined to the eastern side of the building.

Figure 4 is a copy of Figure 6-10e from the RI – showing the estimated area of impact outside the Lovejoy building.

Figures 5 and 6 show that TCE impacts are confined to the top 8 ft, with contamination in some locations extending to about 12 ft, the average depth to the SWBZ. Below about 12 ft (within the SWBZ) the soil exposure pathways are deemed incomplete.

Figure 7 summarizes groundwater data collected from the shallow monitoring wells during the RI. Note – the results from grab water samples collected from within areas of impact are not shown. The temporary wells were located in shallow borings on the east side of the building. These water samples were collected from screened intervals inclusive of soil contamination. Thus contaminants in soil, especially in the shallow perched water at Lovejoy, appears to have biased the groundwater results in the temporary wells. In other words, the data collected from a temporary well, set within a known area of soil impact, reflects the contaminated soil into which they were drilled, rather than actual groundwater quality, and thus should not be considered reliable for evaluating groundwater exposure. Hence Figure 7 shows only shallow monitoring well data.

### **Exposure Pathways**

1. Incidental ingestion of soil is applicable for site workers' possible exposure to soil contaminants present at depths less than 0.5 ft. The depth criteria was obtained from *"Environmental Data Needed for Public Health Assessments"* prepared by the U.S. Department of Health and Human Services (1994) which states:

“Contaminated soils may expose individuals who live, play, or work near the site to multiple contaminants at levels of health concern. Ingestion of contaminated surface soil, particularly by children, is a primary concern. Inhalation of contaminated dusts and direct dermal contact with contaminated soils also can lead to adverse health effects. Generally, the public is exposed to only the top few inches of soil; therefore, ATSDR has defined surface soil as the top 3 inches.”

2. Inhalation of volatile contaminants from soil is applicable for site workers' possible exposure within the unsaturated zone.
3. Ingestion or inhalation of TCE by construction worker exposure to impacted soil is also a complete pathway. However the RAOs for TCE are more stringent for the commercial workforce than for construction workers. Further, any construction or utility work would require special personal protective equipment (PPE). The site will undoubtedly have a requirement for construction worker caution statements for any property having residual contamination in place. As such the construction worker and utility exposure pathways should be considered incomplete for all exposure scenarios.
4. Soil component of the groundwater ingestion pathway (SCGIR) is complete for exposure to the SWBZ. A site specific SSL should be developed for addressing the possibility of contaminating the SWBZ. Note – perimeter well data (see Figure 7) show that the SWBZ is not impacted above Class II levels for TCE. This further confirms that migration of soil impacts, which may have originated onsite many years ago, has not occurred.
5. Soil component of the groundwater ingestion pathway (SCGIR) for exposure to the alluvial aquifer is incomplete. The aquifer is not present in this portion of the EIP.
6. Soil component of the groundwater ingestion pathway (SCGIR) is not complete for exposure to the bedrock aquifer because migration of TCE from shallow soils to the bedrock aquifer at Lovejoy is not predicted to occur. Reasons include:
  - a. The area geology limits migration potential. Two primary geologic units underlie the Lovejoy Property and play a role in the occurrence and movement of groundwater. The upper-most bedrock unit, a Paleozoic dolomite rock, is overlain by two types of glacial materials: clayey, silty till and outwash sands and gravels. Below a depth of about 23 feet, an additional thickness of at least 43 feet of low-permeability, unfractured clay till exists at Lovejoy (see boring log for SS262D, logs for CPT 57 and CPT 58).

- b. The alluvial aquifer is not located beneath Lovejoy's property. Thus the conduit proposed in the RI for transport of contaminants to the bedrock aquifer does not exist at Lovejoy. Figure 6-23, shows that the alluvial aquifer is located north (upgradient) of the Lovejoy site. The figure shows no impacts near Lovejoy.
  - c. The SCGIR SSL presented in the RI was calculated using a groundwater objective equal to the maximum contaminant level (MCL) of 5 µg/L for TCE. This objective is not appropriate for Lovejoy because the shallow water bearing zone is nonpotable (Class II groundwater). The RI notes that because the SWBZ is believed to be predominantly discontinuous a potentiometric surface map was not created. For this reason, hydraulic gradients, flow directions, and groundwater velocities were not determined. Because the SWBZ is discontinuous (and possibly perched) transport from this water bearing zone is not predicted. **Note – the RI terms this groundwater “water bearing zone” and does not use the term “aquifer” in its description.**
  - d. The area of soil impact for the Lovejoy property (see Figure 6-10e for reference) is confined to the shallow soils and located within 100 ft of the building north-south centerline. No soil impacts above proposed SSLs were detected in soils located at the site perimeter – a further indication that even after many years onsite, migration of TCE has not occurred.
  - e. The bedrock aquifer flows south southeast (see pg. 10-8). Contaminants were detected in the bedrock aquifer upgradient of Lovejoy, but a sample collected from the bedrock aquifer well installed on the Lovejoy property (MW262D) showed no measurable contamination.
  - f. During the Core Group-EPA meeting on April 17, an Illinois EPA representative stated that they wanted to make certain that the SCGIR SSL would protect Downers Grove Municipal Well #10. It should be noted that this well is located upgradient of the Lovejoy site and thus impacts migrating to the well pump are not expected to occur.
7. Vapor intrusion - Because TCE and certain degradation products are present in shallow soils and groundwater, a pathway risk assessment is proposed to better determine if the pathway is complete at Lovejoy.

### **Proposed Remedial Objectives**

For this memo, the proposed remedial action objectives (RAOs) were based on Illinois EPA's Tiered Approach to Corrective Action Cleanup Objectives (TACO) given in 35 IAC 742:

- Soil Ingestion
- Soil Inhalation
- Soil Component of Groundwater Migration (Soil Leachate)

### **SSLs Applicable to Lovejoy**

Table 2 presents the Remedial Action Objectives that are applicable at Lovejoy. These objectives were taken from 35 IAC 742 – the Illinois EPA’s Tiered Approach to Corrective Action Objectives (TACO) or, in the case of the SCGIR, the value applicable to a similar release nearby was used. In this case, the inhalation standard for industrial exposure was used because it is not appropriate to calculate a hydraulic gradient for the SWBZ present at Lovejoy because fluctuations in SWBZ level caused by weather conditions will alter water levels (rise or fall) across the site. As such, the SSL equation used to derive a SCGIR RAO for the EIP is not applicable. It is assumed that remedial action(s) to achieve the RAO’s will be performed. At Lovejoy, the following is a potential remedial approach for consideration.

### **Potential Remedial Approach**

Based on our discussion at the May 8, 2009 meeting, we understand that the first step will be to identify and evaluate remedial options for addressing impacts located outside the building. If Lovejoy performs early action, the exact time frames will be determined in the Work Plan that will be negotiated with and attached to the Administrative Order that authorizes Lovejoy to perform the work.

- Identify and evaluate potential remedial options for addressing impacts located outside of the building - approximate area is 38 ft by 90 ft. Average depth estimated at 12 ft based on average depth to top of SWBZ. Estimated soil to be remedied is 1,520 c.y. or at 1.7 ton/c.y., roughly 2,600 tons. Confirmation samples will either be collected before the remedy is implemented, i.e., the limits of contamination will be predetermined) or following the remedy.
- The maximum TCE groundwater concentration detected was 7.7 µg/L which is less than the proposed RAO. Further, there is no exposure to the SWBZ onsite. Thus no additional shallow groundwater treatment is needed.
- Identify and evaluate potential remedial options for addressing impacts located inside of the building.
  - Literature research to identify options for in situ TCE degradation
  - Evaluate feasible options and design pilot study
  - Perform pilot study at plant
  - Collect data & present results to EPA
  - Re - Evaluate interior building RAOs
  - Design full-scale remedy
  - Implement remedy

- Confirmation sampling to verify
- Report results

Figure 8 summarizes the work areas that would result under this site model. Please note that in order for *E. Cooney Associates* and legal counsel to advise Lovejoy regarding the early remedial action option at its property, we will need to receive feedback from EPA and determine if this approach is generally acceptable to EPA and if not, the approach(es) that will be acceptable. Thank you in advance for your willingness to work with us, and we will advise and reach a decision with Lovejoy as quickly as possible after we hear back from you. As such and consistent with your short extension of our deadline to comment on the draft RI, we understand that the e-mail you sent on Thursday, May 14, 2009 imposing a May 20, 2009 deadline for determining whether to perform early action will be extended to allow us to receive and advise Lovejoy regarding your response to this site model. Thank you in advance for your review of the site model, and we look forward to receiving your response.

Table 1. TCE Data Summary

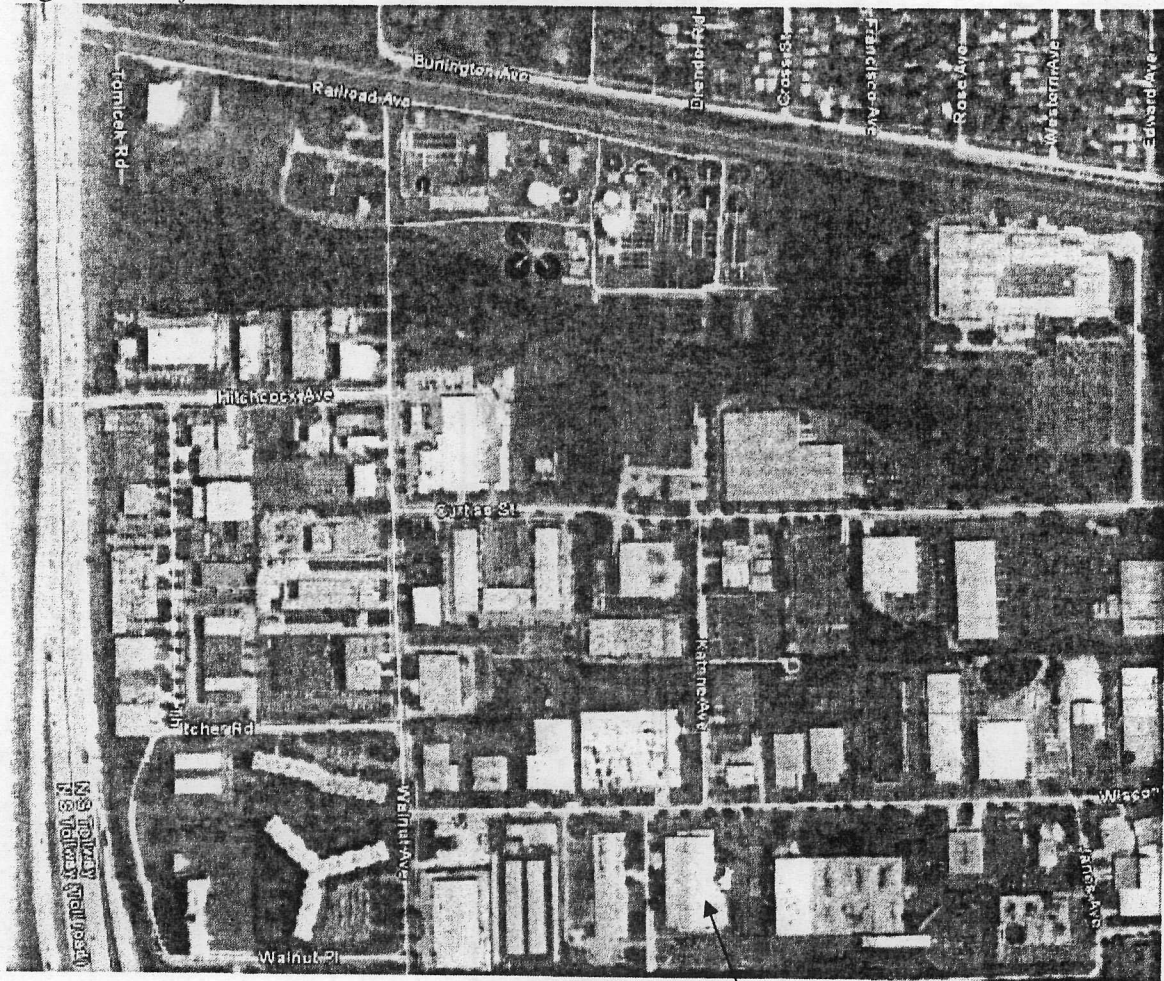
Location	Detected?
Beneath Building	Yes
Exterior Shallow Soil ( 0 – 3 ft)	Yes
Exterior Intermediate Soil (3 – 10 ft)	Yes
Exterior Deep Soil (unsat'd, 10+ ft)	Yes
Shallow GW	Yes, but < RAO
Intermediate GW (@30 - 50 ft)	GW Not Present
Bedrock Aquifer (@85+ ft)	No

Table 2. Proposed Remedial Action Objectives For Lovejoy

CAS No.	Analyte	Industrial/Commercial Route Specific Values for Soil		Construction Worker Route Specific Values for Soil		SCGIR	Groundwater	Vapor
		Ingestion (mg/Kg)	Inhalation (mg/Kg)	Ingestion (mg/Kg)	Inhalation (mg/Kg)	Class II (mg/Kg)	Class II (mg/L)	Intrusion (mg/Kg)
156-59-2	cis-1,2-Dichloroethene	20,000	1,200	20,000	1,200	1,200	0.2	TBD
156-60-5	trans-1,2-Dichloroethene	41,000	3,100	41,000	3,100	3,100	0.5	TBD
127-18-4	Tetrachloroethene	110	20	2,400	28	20	0.025	TBD
79-01-6	Trichloroethene	520	8.9	1,200	12	8.9	0.025	TBD
75-01-4	Vinyl chloride	7.9	1.1	170	1.1	1.1	0.01	TBD

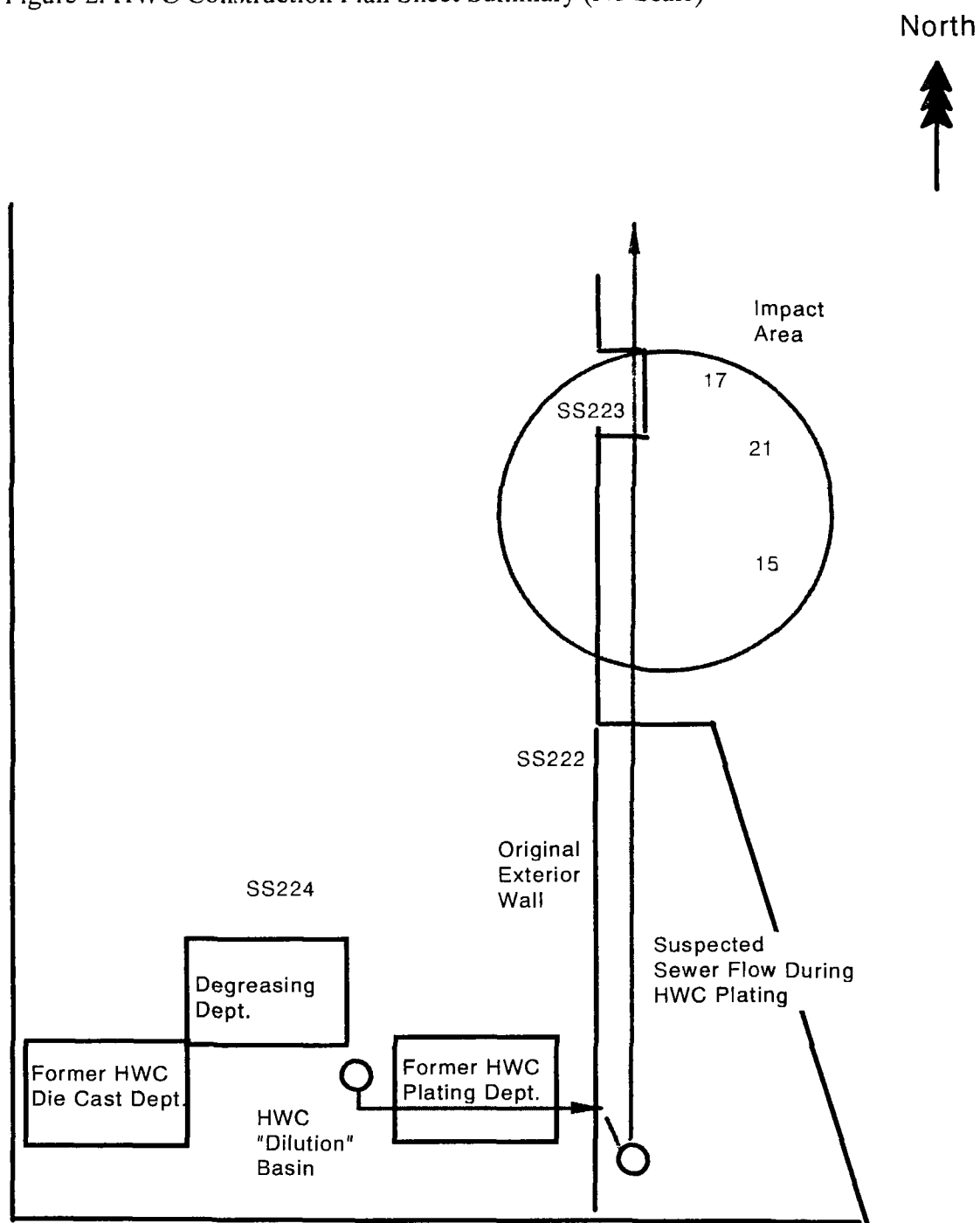
TBD is To Be Determined

Figure 1. Project Area



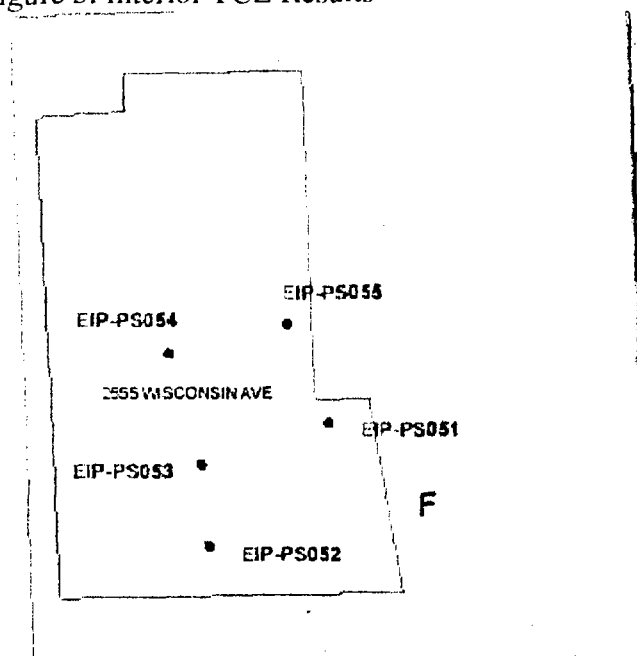
Lovejoy

Figure 2. HWC Construction Plan Sheet Summary (No Scale)



Sample Locations in "blue". Red line is old sewer, as portrayed in construction/plumbing diagram.

Figure 3. Interior TCE Results



## Soil Gas Locations

Soil Gas #	TCE (ng)	Cis-DCE (ng)
051	1,648	7,594
052	150	30
053	27,843	14,791
054	55	ND
055	4,698	2,675

## Interior Soil Sample Results

Soil Gas #	Soil Sample #	TCE (µg/Kg) (0 - 2 ft)	TCE (µg/Kg) (2 - 4 ft)	TCE (µg/Kg) (4 - 6 ft)	TCE (µg/Kg) (6 - 8 ft)	TCE (µg/Kg) (8 - 10 ft)
051	SS222	87	543	859	271	63
052	NS	-	-	-	-	-
053	SS224	128*	40 U	61 U	50 U	44 U
054	NS	-	-	-	-	-
055	SS223	1,948	26,024	30,481	197,497	NS

NS is No Sample

\* Average result

U is undetected

Figure 4. Exterior Sampling Results – RI Figure 6-10e

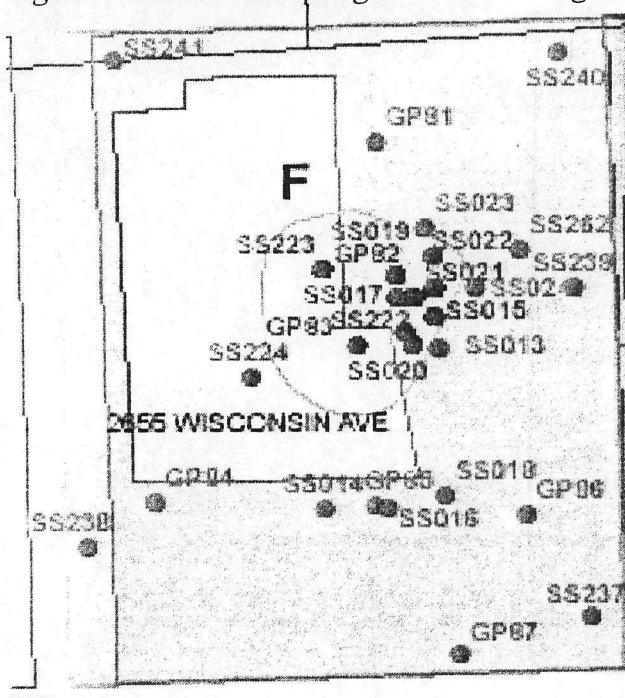
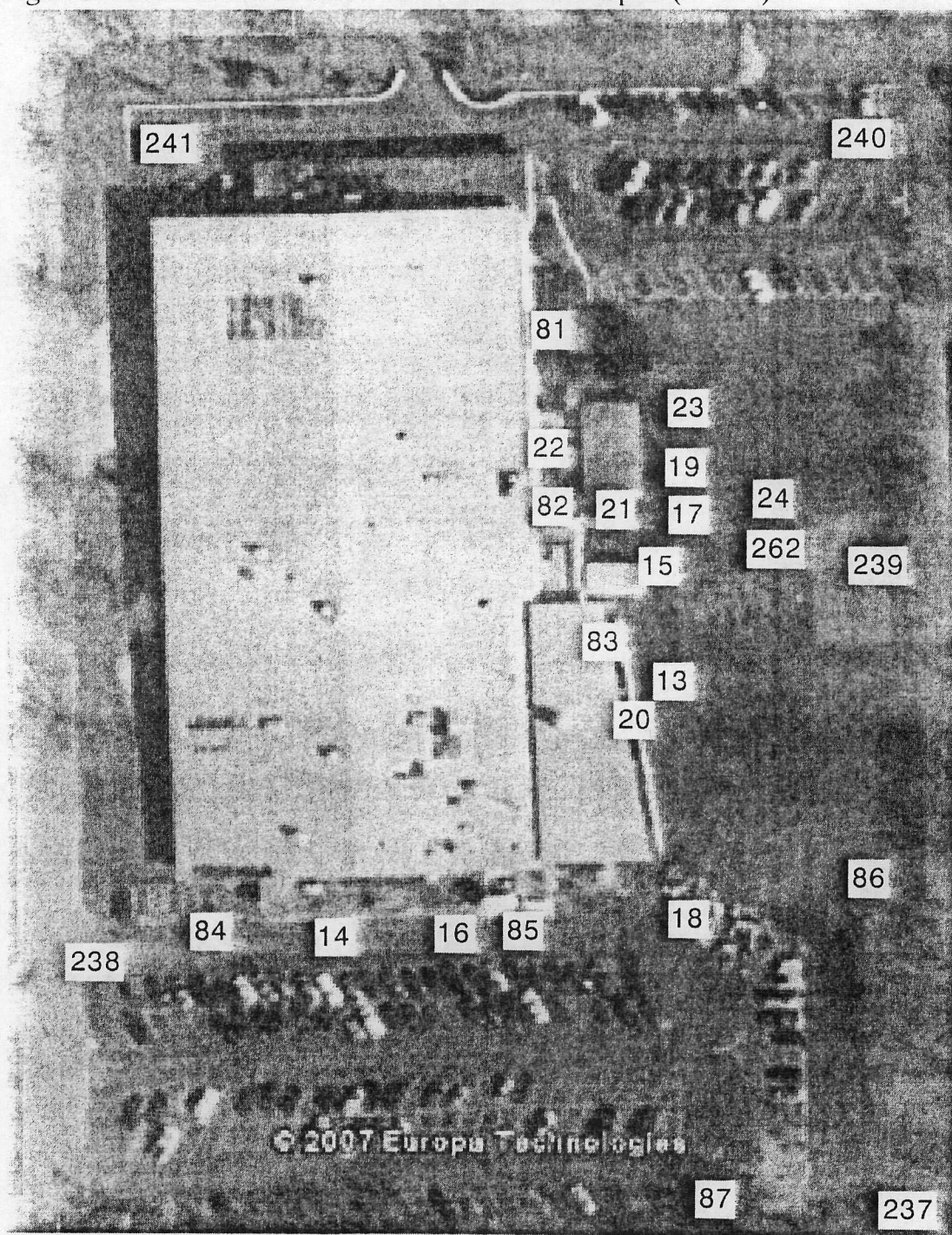


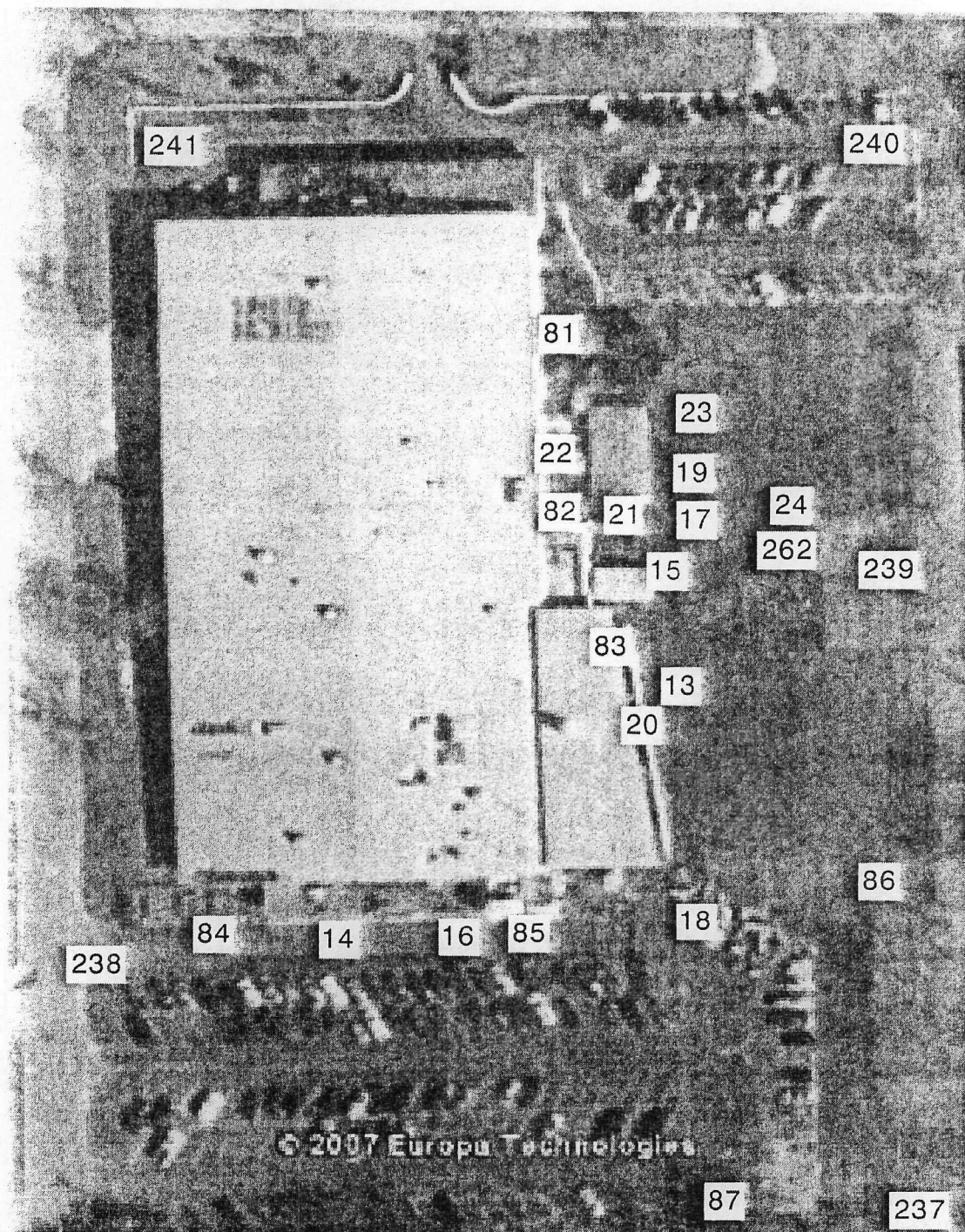
Figure 5. Exterior Shallow Soil – Estimated Area of Impact (0 – 8 ft).



Key: Blue sample numbers < RAO TCE (soil)

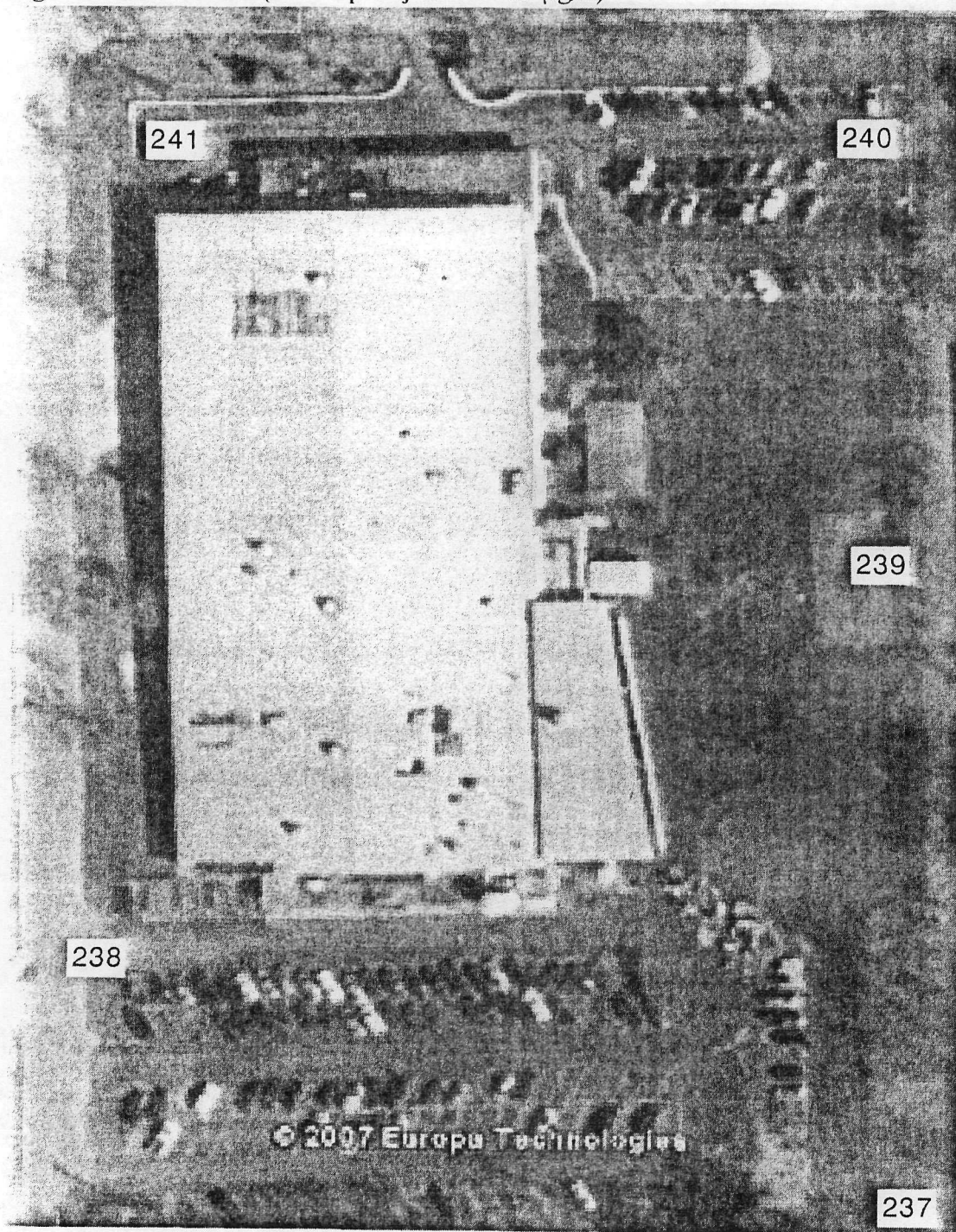
Red sample numbers > RAO TCE (soil)

Figure 6. Exterior Shallow Soil – Estimated Area of Impact (8 – 12 ft)



Key: Blue sample numbers < RAO TCE (soil)  
Red sample numbers > RAO TCE (soil)

Figure 7. SWBZ Data (Cleanup Objective = 25  $\mu\text{g/L}$ )



Key: Blue sample numbers < RAO TCE (soil)  
Red sample numbers > RAO TCE (soil)

Figure 8. Proposed Work Areas

